```
RRRRRRRRRRRR    MMM          MMM     SSSSSSSSSSSS
RRRRRRRRRRRR    MMM          MMM     SSSSSSSSSSSS
RRRRRRRRRRRR    MMM          MMM     SSSSSSSSSSSS
RRR        RRR  MMMMMM    MMMMMM  SSS
RRR        RRR  MMMMMM    MMMMMM  SSS
RRR        RRR  MMMMMM    MMMMMM  SSS
RRR        RRR  MMM   MMM   MMM  SSS
RRR        RRR  MMM   MMM   MMM  SSS
RRR        RRR  MMM   MMM   MMM  SSS
RRRRRRRRRRRR    MMM          MMM     SSSSSSSSS
RRRRRRRRRRRR    MMM          MMM     SSSSSSSSS
RRRRRRRRRRRR    MMM          MMM     SSSSSSSSS
RRR   RRR       MMM          MMM              SSS
RRR   RRR       MMM          MMM              SSS
RRR   RRR       MMM          MMM              SSS
RRR      RRR    MMM          MMM              SSS
RRR      RRR    MMM          MMM              SSS
RRR      RRR    MMM          MMM              SSS
RRR        RRR  MMM          MMM  SSSSSSSSSSSSS
RRR        RRR  MMM          MMM  SSSSSSSSSSSSS
RRR        RRR  MMM          MMM  SSSSSSSSSSSSS
```

```
                                                   I 16
**FILE**ID**RM1JOURNL




RRRRRRRR    MM      MM      11              JJ    OOOOOO    UU      UU  RRRRRRRR    NN      NN  LL
RRRRRRRR    MM      MM      11              JJ    OOOOOO    UU      UU  RRRRRRRR    NN      NN  LL
RR      RR  MMMM  MMMM    1111              JJ  OO      OO  UU      UU  RR      RR  NN      NN  LL
RR      RR  MMMM  MMMM    1111              JJ  OO      OO  UU      UU  RR      RR  NN      NN  LL
RR      RR  MM  MM  MM      11              JJ  OO      OO  UU      UU  RR      RR  NNNN    NN  LL
RR      RR  MM  MM  MM      11              JJ  OO      OO  UU      UU  RR      RR  NNNN    NN  LL
RRRRRRRR    MM      MM      11              JJ  OO      OO  UU      UU  RRRRRRRR    NN  NN  NN  LL
RRRRRRRR    MM      MM      11              JJ  OO      OO  UU      UU  RRRRRRRR    NN  NN  NN  LL
RR  RR      MM      MM      11      JJ      JJ  OO      OO  UU      UU  RR  RR      NN    NNNN  LL
RR  RR      MM      MM      11      JJ      JJ  OO      OO  UU      UU  RR  RR      NN    NNNN  LL
RR    RR    MM      MM      11      JJ      JJ  OO      OO  UU      UU  RR    RR    NN      NN  LL                ....
RR    RR    MM      MM      11      JJ      JJ  OO      OO  UU      UU  RR    RR    NN      NN  LL                ....
RR      RR  MM      MM    111111      JJJJJJ      OOOOOO    UUUUUUUUUU  RR      RR  NN      NN  LLLLLLLLLL        ....
RR      RR  MM      MM    111111      JJJJJJ      OOOOOO    UUUUUUUUUU  RR      RR  NN      NN  LLLLLLLLLL        ....


LL            IIIIII      SSSSSSSS
LL            IIIIII      SSSSSSSS
LL              II      SS
LL              II      SS
LL              II      SS
LL              II      SS
LL              II        SSSSSS
LL              II        SSSSSS
LL              II              SS
LL              II              SS
LL              II              SS
LL              II              SS
LLLLLLLLLL    IIIIII    SSSSSSSS
LLLLLLLLLL    IIIIII    SSSSSSSS
```

Table of contents

```
0000            $BEGIN  RM1JOURNL,000,RM$RMS_JOURNAL,<Sequential specific journaling>
0000    ;
0000    ;*****************************************************************************
0000    ;*                                                                           *
0000    ;*  COPYRIGHT (c) 1978, 1980, 1982, 1984 BY                                  *
0000    ;*  DIGITAL EQUIPMENT CORPORATION, MAYNARD, MASSACHUSETTS.                   *
0000    ;*  ALL RIGHTS RESERVED.                                                     *
0000    ;*                                                                           *
0000    ;*  THIS SOFTWARE IS FURNISHED UNDER A LICENSE AND MAY BE USED AND COPIED    *
0000    ;*  ONLY IN  ACCORDANCE WITH  THE  TERMS  OF  SUCH  LICENSE  AND WITH THE    *
0000    ;*  INCLUSION OF THE ABOVE COPYRIGHT NOTICE. THIS SOFTWARE OR  ANY  OTHER    *
0000    ;*  COPIES THEREOF MAY NOT BE PROVIDED OR OTHERWISE MADE AVAILABLE TO ANY    *
0000    ;*  OTHER PERSON.  NO TITLE TO AND OWNERSHIP OF  THE  SOFTWARE IS  HEREBY    *
0000    ;*  TRANSFERRED.                                                             *
0000    ;*                                                                           *
0000    ;*  THE INFORMATION IN THIS SOFTWARE IS  SUBJECT TO CHANGE WITHOUT NOTICE    *
0000    ;*  AND  SHOULD  NOT  BE  CONSTRUED AS  A COMMITMENT BY DIGITAL EQUIPMENT    *
0000    ;*  CORPORATION.                                                             *
0000    ;*                                                                           *
0000    ;*  DIGITAL ASSUMES NO RESPONSIBILITY FOR THE USE  OR  RELIABILITY OF ITS    *
0000    ;*  SOFTWARE ON EQUIPMENT WHICH IS NOT SUPPLIED BY DIGITAL.                  *
0000    ;*                                                                           *
0000    ;*                                                                           *
0000    ;*****************************************************************************
0000    ;
0000
0000    ;++
0000    ;
0000    ; FACILITY:     RMS-32
0000    ;
0000    ; ABSTRACT:     This module contains the routines which journal record
0000    ;               operations performed on sequential files.
0000    ;
0000    ;
0000    ; ENVIRONMENT:  VAX/VMS Operating System
0000    ;
0000    ;
0000    ;--
0000    ;
0000    ; AUTHOR:       Tamar Krichevsky, CREATION DATE: 28-May-1983
0000    ;
0000    ; MODIFIED BY:
0000    ;
0000    ;       V03-005 TSK0004         Tamar Krichevsky                9-Dec-1983
0000    ;               Add support for BI journaling.
0000    ;
0000    ;               *************************************************************
0000    ;               *
0000    ;               *  THE CODE FOR BI JOURNALING OF TRUNCATE OPERATIONS HAS NOT
0000    ;               *  BEEN TESTED.
0000    ;               *
0000    ;               *************************************************************
0000    ;
0000    ;       V03-004 JWT0141         Jim Teague                      11-Nov-1983
0000    ;               Change IFB$V_RUM to IFB$V_ONLY_RU
0000    ;
```

```
0000    ;       V03-003 TSK0003         Tamar Krichevsky                5-Oct-1983
0000    ;               Use RM$RETJNLBDB and RM$ALJNLBDB instead of RM$RETBDB and
0000    ;               RM$ALBDB when allocating a large journal buffer.
0000    ;
0000    ;       V03-002 TSK0002         Tamar Krichevsky                27-Jun-1983
0000    ;               Pass journal BDB to RM$WRTJNL instead of related BDB for
0000    ;               AI operations.
0000    ;
0000    ;       V03-001 TSK0001         Tamar Krichevsky                22-Jun-1983
0000    ;               Clean up comments for MAKE_AI_JNL.
0000    ;
0000    ;**
0000
0000
0000            .SBTTL  DECLARATIONS
0000    ;
0000    ; INCLUDE FILES:
0000    ;
0000
0000    ;
0000    ; MACROS:
0000    ;
0000            $IFBDEF
0000            $BDBDEF
0000            $IRBDEF
0000            $FABDEF
0000            $RABDEF
0000            $RMSDEF
0000            $RJRDEF
0000            $CJFDEF
0000    ;
0000    ; EQUATED SYMBOLS:
0000    ;
0000
0000    ;
0000    ; OWN STORAGE:
0000    ;
0000
```

```
                               0000          .SBTTL  RM$SEQJNL - Sequential journaling setup
                               0000
                               0000    ;++
                               0000    ;
                               0000    ; FUNCTIONAL DESCRIPTION:
                               0000    ;
                               0000    ;       RM$SEQJNL is called when a sequential file record operation needs
                               0000    ;       to be journaled.  It fills in the recover journal record (RJR) with
                               0000    ;       the appropriate information and the returns to the caller.
                               0000    ;
                               0000    ; CALLING SEQUENCE:
                               0000    ;
                               0000    ;       BSBW    RM$SEQJNL
                               0000    ;
                               0000    ; INPUT PARAMETERS:
                               0000    ;
                               0000    ;       4(SP)   type of record operation to be performed
                               0000    ;       R4      BDB address
                               0000    ;       R5      Data record address
                               0000    ;       R6      Data record size
                               0000    ;       R8      RAB
                               0000    ;       R9      IRAB
                               0000    ;       R10     IFAB
                               0000    ;       R11     Impure
                               0000    ;
                               0000    ; IMPLICIT INPUTS:
                               0000    ;
                               0000    ;       IRB$L_JNLBDB    Address of journal BDB
                               0000    ;
                               0000    ; OUTPUT PARAMETERS:
                               0000    ;
                               0000    ;       R0      Status
                               0000    ;       R1 - R3 Destroyed
                               0000    ;
                               0000    ; IMPLICIT OUTPUTS:
                               0000    ;
                               0000    ;       None
                               0000    ;
                               0000    ; COMPLETION CODES:
                               0000    ;
                               0000    ;       None
                               0000    ;
                               0000    ; SIDE EFFECTS:
                               0000    ;
                               0000    ;       The journal buffer and BDB may be released and new ones allocated,
                               0000    ;       if the the existing buffer is not large enough to hold the current
                               0000    ;       record.
                               0000    ;
                               0000    ;--
                               0000
                               0000
                               0000    RM$SEQJNL::
                    30    BB   0000            PUSHR   #^M<R4, R5>                     ; Save BDB and record addresses
             54     30 A9  D0  0002            MOVL    IRB$L_JNLBDB(R9), R4            ; Get the journal BDB
                               0006
                               0006    ;+
                               0006    ;
```

```
                          0006  ; The buffer for the journal entry must be large enough to hold the current
                          0006  ; record and any overhead necessary to describe the record.  If the buffer is
                          0006  ; not large enough, then deallocate it and its BDB.  Then, allocate a new buffer
                          0006  ; (and buffer descriptor block) which will be large enough.
                          0006  ;
                          0006  ; If the operation being journaled is a BI $TRUNCATE or BI $PUT, with the TPT
                          0006  ; option, then skip this check.  Journaling for these operations is done block
                          0006  ; mode.  Therefore, a different set of criteria is used to check the size of
                          0006  ; the journal buffer.
                          0006  ;
                          0006  ;-
                          0006
      06 00A0 CA   02  E1 0006          BBC     #IFB$V_BI, IFB$B_JNLFLG(R10), 10$ ; If not BI, check jnl buff size
           04 AE   1F  93 000C          BITB    #<RJR$_TPT!RJR$_TRUNCATE>, 4(SP)  ; BI TPT or TRUNCATE?
                   53  12 0010          BNEQ    30$                               ; Yes, skip size check
                          0012
51   2C A4   0048 8F   A3 0012  10$:    SUBW3   #RJR$C_RECLEN,BDB$W_ALLOC_SIZE(R4),R1 ; Ignore jrnl entry overhead
  52   66 A9   64 A9   A3 0019          SUBW3   IRB$W_ROVHDSZ(R9), -              ; Ignore the overhead for the
                          001F                  IRB$W_RTOTLSZ(R9), R2             ;     current record, also
        52   5F AA     A0 001F          ADDW2   IFB$B_FSZ(R10), R2                ; Do count fixed header part
              51   52  B1 0023          CMPW    R2, RT                            ; Will record fit in buffer?
                   3D  1B 0026          BLEQU   30$                               ; Yes, Make and write jnl entry
                          0028
                   04  BB 0028          PUSHR   #^M<R2>                           ; Save the record size
          00000000'EF  16 002A          JSB     RM$RETJNLBDB                      ; Release this buffer and BDB
                   20  BA 0030          POPR    #^M<R5>                           ; Get record size - It is put in
                          0032                                                    ; R5 because of RM$ALDBUF
     55   00000048 8F  C0 0032          ADDL2   #RJR$C_RECLEN, R5                 ; Add in journal entry overhead
     55   000001FF 8F  C0 0039          ADDL2   #511, R5                          ; Round up to a
     55   000001FF 8F  CA 0040          BICL2   #511, R5                          ;     page boundary
          00000000'EF  16 0047          JSB     RM$ALDJNLBUF                      ; Get new buffer and BDB
                03 50  E8 004D          BLBS    R0, 20$                           ; Keep going if everything is ok
                 005A  31 0050          BRW     EXIT                              ; Get out on error
                          0053  20$:    SSB     #BDB$V_PRM, BDB$B_FLGS(R4)        ; Mark BDB as permanent
              18 B4    7C 0058          CLRQ    @BDB$L_ADDR(R4)                   ; Clear the top of the buffer
        30 A9     54   D0 005B          MOVL    R4, IRB$L_JNLBDB(R9)              ; Save the BDB's address
        55    04 AE    D0 005F          MOVL    4(SP), R5                         ; Restore the record address
                  04   11 0063          BRB     40$
                          0065
                          0065  ;+
                          0065  ;
                          0065  ; The journal buffer is all set.  Now, the journal entry is filled in and
                          0065  ; written to the journal.  First, fill in the overhead which describes the
                          0065  ; record.
                          0065  ;
                          0065  ;-
                          0065
        53    18 A4    D0 0065  30$:    MOVL    BDB$L_ADDR(R4), R3                ; Get the jnl buffer address
        03 A3    02    90 0069  40$:    MOVB    #RJR$C_RECORD, RJR$B_ENTRY_TYPE(R3); A record is being jnl'ed
        04 A3    00    90 006D          MOVB    #RJR$C_SEQ, RJR$B_ORG(R3)         ; File org. is sequential
     05 A3    0C AE    90 0071          MOVB    12(SP), RJR$B_OPER(R3)            ; Type of record operation
     40 A3    48 A9    D0 0076          MOVL    IRB$L_RP_VBN(R9), RJR$L_RFA0(R3); RFA is needed, get VBN part
     44 A3    4C A9    B0 007B          MOVW    IRB$L_RP_OFF(R9), RJR$W_RFA4(R3);        and offset into block
        51    48 A3    9E 0080          MOVAB   RJR$T_RIMAGE(R3), R1              ; Point to start of record image
                          0084
                          0084  ;+
                          0084  ;
```

```
                         0084     ; Do the journal-type specific stuff.
                         0084     ;
                         0084     ; AI journaling
                         0084     ;
                         0084     ;-
                         0084
   13 00A0 CA    03  E1  0084              BBC     #IFB$V_AI, IFB$B_JNLFLG(R10), 50$; If not AI jnl'ing, keep going
                 24  10  008A              BSBB    MAKE_AI_JNL                      ; Make the AI record image.
              1E 50  E9  008C              BLBC    R0, EXIT                         ; Get out on error
                 54  DD  008F              PUSHL   R4                               ; Use jnl BDB as related BDB
           7E    03  9A  0091              MOVZBL  #CJF$_AI, -(SP)                  ; Pass jnl type to RM$WRTJNL
              FF69'  30  0094              BSBW    RM$WRTJNL                        ; Write journal entry
           5E    08  C0  0097              ADDL2   #8, SP                           ; Remove arguments from stack
              10 50  E9  009A              BLBC    R0, EXIT                         ; Get out on error
                         009D
                         009D     ;+
                         009D     ;
                         009D     ; BI journaling
                         009D     ;
                         009D     ;-
                         009D
      00A0 CA    03  93  009D     50$:     BITB    #<IFB$V_BI!IFB$V_RU>,IFB$B_JNLFLG(R10)    ; BI or RU jnling?
                 09  13  00A2              BEQL    EXIT                                     ; No, then continue
                         00A4
        05 A3    1F  93  00A4              BITB    #<RJR$_TPT!RJR$_TRUNCATE>, RJR$B_OPER(R3) ; BI TPT or TRUNCATE?
                 03  12  00A8              BNEQ    EXIT                             ; Yes, jnl entry was already written
               020D  30  00AA              BSBW    WRTBIJNL                         ; Write jnl entry
                         00AD
                         00AD     EXIT:
                 30  BA  00AD              POPR    #^M<R4, R5>
                     05  00AF              RSB
```

```
00B0
00B0            .SBTTL  MAKE_AI_JNL - Put operation specific info in AI jnl
00B0
00B0    ;++
00B0    ;
00B0    ; FUNCTIONAL DESCRIPTION:
00B0    ;
00B0    ;       MAKE_AI_JNL moves the operation specific information in the journal
00B0    ;       entry for an AI journal.
00B0    ;
00B0    ; CALLING SEQUENCE:
00B0    ;
00B0    ;       BSBW    MAKE_AI_JNL
00B0    ;
00B0    ; INPUT PARAMETERS:
00B0    ;
00B0    ;       R1      Address of record image portion of journal buffer
00B0    ;       R3      Journal buffer address
00B0    ;       R4      Journal BDB address
00B0    ;       R5      Record address
00B0    ;       R6      Record length
00B0    ;       R8      RAB
00B0    ;       R9      IRAB
00B0    ;       R10     IFAB
00B0    ;
00B0    ; IMPLICIT INPUTS:
00B0    ;
00B0    ;       None
00B0    ;
00B0    ; OUTPUT PARAMETERS:
00B0    ;
00B0    ;       R0      Status
00B0    ;       R1 - R3 Destroyed
00B0    ;
00B0    ; IMPLICIT OUTPUTS:
00B0    ;
00B0    ;       None
00B0    ;
00B0    ; COMPLETION CODES:
00B0    ;
00B0    ;       RHB or RBF
00B0    ;
00B0    ; SIDE EFFECTS:
00B0    ;
00B0    ;       None
00B0    ;
00B0    ;--
00B0
00B0
00B0    MAKE_AI_JNL:
00B0
00B0    ;+
00B0    ;
00B0    ; Fill in AI specific information in the journal entry.  Then if the record
00B0    ; being journaled is VFC format, copy the fixed header portion into the
00B0    ; the record image.
00B0    ;
```

```
                              00B0  ;-
                              00B0
                   30   BB    00B0          PUSHR   #^M<R4, R5>                        ; Save jnl bdb and record adr
              50   01   D0    00B2          MOVL    #1, R0                             ; Assume success
           06 A3   01   90    00B5          MOVB    #RJR$C_RMS_AI, RJR$B_JNL_TYPE(R3); This is an AI journal entry
     14 A4   0048  8F   B0    00B9          MOVW    #RJR$C_RECLEN, BDB$W_NUMB(R4)      ; Journal entry contAIns at
                              00BF                                                     ;       least the overhead
           05 A3   1B   91    00BF          CMPB    #RJR$_TRUNCATE, RJR$B_OPER(R3)     ; Is the operation truncation?
                   57   13    00C3          BEQL    TRUNC_ENTRY                        ; No need to copy any data
                              00C5
           46 A3   56   B0    00C5          MOVW    R6, RJR$W_RSIZE(R3)                ; Save the record's size
           14 A4   56   A0    00C9          ADDW2   R6, BDB$W_NUMB(R4)                 ; Add rec len to jnl entry size
           50 AA   03   91    00CD          CMPB    #FAB$C_VFC, IFB$B_RFMORG(R10)      ; Is the record VFC format?
                   27   12    00D1          BNEQ    40$                                ; No, copy the record
                              00D3
                              00D3  ;+
                              00D3  ;
                              00D3  ; Copy the fixed header portion of the record.
                              00D3  ;
                              00D3  ;-
                              00D3
           52   5F AA   9A    00D3          MOVZBL  IFB$B_FSZ(R10), R2                 ; Get length of fixed hdr part
           14 A4   52   A0    00D7          ADDW2   R2, BDB$W_NUMB(R4)                 ; Count FSZ in jnl entry size
           50   2C A8   D0    00DB          MOVL    RAB$L_RHB(R8), R0                  ; Get adr of user's hdr buffer
                   08   12    00DF          BNEQ    20$                                ; If buffer adr given, copy hdr
   61   52   00   60   00   2C    00E1      MOVC5   #0, (R0), #0, R2, (R1)             ; Zero hdr part of record image
                   0B   11    00E7          BRB     30$                                ; Copy variable portion of rec
                              00E9  20$:    IFNORD  R2, (R5), ERRRHB, IRB$B_MODE(R9); Quit if hdr can't be read
        61   65   52   28    00F0          MOVC3   R2, (R5), (R1)                     ; Copy hdr part to record image
              51   53   D0    00F4  30$:    MOVL    R3, R1                             ; Point to next byte in rec image
              54   6E   7D    00F7          MOVQ    (SP), R4                           ; Retrieve BDB and rec adr
                              00FA
                              00FA  ;+
                              00FA  ;
                              00FA  ; Copy the record to the journal entry.
                              00FA  ;
                              00FA  ;-
                              00FA
        0200 8F   56   B1    00FA  40$:    CMPW    R6, #512                           ; Is record longer than a page?
                   0B   1B    00FF          BLEQU   50$                                ; Yes, do short read probe
         00000000'EF   16    0101          JSB     RM$PROBEREAD                       ; No, do a long probe
              1C 50   E9    0107          BLBC    R0, ERRBUF                         ; Get out on error
                   0B   11    010A          BRB     60$                                ; Continue processing
                              010C  50$:    IFNORD  R6, (R5), ERRBUF, IRB$B_MODE(R9); Quit if record can't be read
        61   65   56   28    0113          MOVC3   R6, (R5), (R1)                     ; Copy record to jnl entry
                              0117  60$:    RMSSUC                                     ; Journal entry is complete
                   00   11    011A          BRB     EXIT_AI_RTN
                              011C
                              011C  ;+
                              011C  ;
                              011C  ; All the information necessary for AI recovery of a $TRUNCATE operation is
                              011C  ; already in the RMS journal record (RJR).  Therefore, no further modification
                              011C  ; needs to be done to the journal entry.
                              011C  ;
                              011C  ;-
                              011C
                              011C  TRUNC_ENTRY:
```

```
                    011C   357 EXIT_AI_RTN:
        30    BA    011C   358          POPR    #^M<R4, R5>
              05    011E   359          RSB                                          ; Return to caller
                    011F   360
                    011F   361 ERRRHB:
                    011F   362          RMSERR RHB
        F6    11    0124   363          BRB     EXIT_AI_RTN
                    0126   364
                    0126   365 ERRBUF:
                    0126   366          RMSERR  RBF
        EF    11    012B   367          BRB     EXIT_AI_RTN
```

```
                    012D
                    012D              .SBTTL  MAKE_BI_JNL - Put operation specific info in BI jnl
                    012D
                    012D        ;++
                    012D        ;
                    012D        ; FUNCTIONAL DESCRIPTION:
                    012D        ;
                    012D        ;       MAKE_BI_JNL moves the operation specific information in the journal
                    012D        ;       entry for an BI journal.
                    012D        ;
                    012D        ; CALLING SEQUENCE:
                    012D        ;
                    012D        ;       BSBW    MAKE_BI_JNL
                    012D        ;
                    012D        ; INPUT PARAMETERS:
                    012D        ;
                    012D        ;       R1      Address of record image portion of journal buffer
                    012D        ;       R3      Journal buffer address
                    012D        ;       R4      Journal BDB address
                    012D        ;       R6      Record length
                    012D        ;       R8      RAB
                    012D        ;       R9      IRAB
                    012D        ;       R10     IFAB
                    012D        ;
                    012D        ; IMPLICIT INPUTS:
                    012D        ;
                    012D        ;       None
                    012D        ;
                    012D        ; OUTPUT PARAMETERS:
                    012D        ;
                    012D        ;       R0      Status
                    012D        ;       R1 - R3 Destroyed
                    012D        ;
                    012D        ; IMPLICIT OUTPUTS:
                    012D        ;
                    012D        ;       None
                    012D        ;
                    012D        ; COMPLETION CODES:
                    012D        ;
                    012D        ;       Any completion code returned by RM$NXTBLK1
                    012D        ;
                    012D        ; SIDE EFFECTS:
                    012D        ;
                    012D        ;       None
                    012D        ;
                    012D        ;--
                    012D
                    012D
                    012D       MAKE_BI_JNL:
                    012D
                    012D        ;+
                    012D        ;
                    012D        ; Fill in BI/RU specific information in the journal entry.
                    012D        ;
                    012D        ;-
                    012D
   00F0 8F    BB    012D              PUSHR   #^M<R4, R5, R6, R7>           ; Save jnl bdb, record adr & len
```

```
             50    01   D0 0131          MOVL    #1, R0                             ; Assume success
   14 A4   0048 8F   B0 0134          MOVW    #RJR$C_RECLEN, BDB$W_NUMB(R4)      ; Journal entry contains at
                        013A                                                     ;       least the overhead
        05 A3    13   91 013A          CMPB    #RJR$_PUT, RJR$B_OPER(R3)          ; Is the operation $PUT?
                 0C   12 013E          BNEQ    20$                                ; No, move data to jnl entry
               0169   31 0140          BRW     PUT_ENTRY                          ; Yes, no need to move data
        05 A3    1C   91 0143    10$:  CMPB    #RJR$_UPDATE, RJR$B_OPER(R3)       ; Is the operation $UPDATE?
                 03   13 0147          BEQL    20$                                ; Yes
               0086   31 0149          BRW     BI_TRUNC_ENTRY                     ; No, it's truncate on put, or $TRUN
                        014C
                        014C
                        014C        ;+
                        014C        ;
                        014C        ; Adjust journal entry size to compensate for any overhead.  If it is VFC,
                        014C        ; include size of fixed header portion.  For UDF, VAR, FIX and VFC do not add in
                        014C        ; size of control (count) field.  Do include overhead for STM, STMLF and STMCR.
                        014C        ; The terminators are counted as overhead, but are also part of the record.
                        014C        ;
                        014C        ;-
                        014C
        46 A3    56   B0 014C    20$:  MOVW    R6, RJR$W_RSIZE(R3)                ; Save rec size in jnl entry
                        0150
                        0150           ASSUME  FAB$C_VFC   GT FAB$C_UDF
                        0150           ASSUME  FAB$C_VFC   GT FAB$C_VAR
                        0150           ASSUME  FAB$C_VFC   GT FAB$C_FIX
                        0150           ASSUME  FAB$C_STM   GT FAB$C_VFC
                        0150           ASSUME  FAB$C_STMLF GT FAB$C_VFC
                        0150           ASSUME  FAB$C_STMCR GT FAB$C_VFC
                        0150           ASSUME  FAB$C_STMCR EQ FAB$C_MAXRFM
                        0150
        50 AA    03   91 0150          CMPB    #FAB$C_VFC, IFB$B_RFMORG(R10)      ; Is the record VFC format?
                 08   1F 0154          BLSSU   30$                                ; No, ignore overhead (count field)
                 16   1A 0156          BGTRU   40$                                ; No, include overhead (terminators)
        56    5F AA   80 0158          ADDB2   IFB$B_FSZ(R10), R6                 ; Yes, include header portion
                 10   11 015C          BRB     40$
      00A1 CA    02   93 015E    30$:  BITB    #<IFB$V_BI_RECVR!IFB$V_RU_RECVR>, IFB$B_RECVRFLGS(R10) ; If in recov
                 09   12 0163          BNEQ    40$                                ;   terminators are already counted
        56    64 A9   A0 0165          ADDW2   IRB$W_ROVHDSZ(R9), R6              ; Stream format, include overhead
     46 A3    64 A9   A0 0169          ADDW2   IRB$W_ROVHDSZ(R9), RJR$W_RSIZE(R3) ; Add overhead to jnl entry size
     14 A4       56   A0 016E    40$:  ADDW2   R6, BDB$W_NUMB(R4)                 ; Increase size of jnl buffer
                        0172
                        0172        ;+
                        0172        ;
                        0172        ; Locate the first byte of the data to be copied to the journal entry.
                        0172        ; NOTE -- This assumes 512 byte blocks.
                        0172        ;
                        0172        ;-
                        0172
        50    20 A9   D0 0172          MOVL    IRB$L_CURBDB(R9), R0               ; Retrieve BDB for buffer
        55    48 A0   9A 0176          MOVZBL  BDB$B_REL_VBN(R0), R5              ; Get block containing record
        55    48 AA   C4 017A          MULL2   IFB$L_DEVBUFSIZ(R10), R5           ; Convert to byte offset
        55    18 A0   C0 017E          ADDL2   BDB$L_ADDR(R0), R5                 ; Add offset to buffer address
        50    4C A9   3C 0182          MOVZWL  IRB$W_RP_OFF(R9), R0               ; Get offset with in block
           55    50   C0 0186          ADDL2   R0, R5                             ; Point to first byte of record
                        0189
                        0189        ;+
                        0189        ;
```

```
                     0189  ; If there is a count field preceeding the record, skip over it so that we are
                     0189  ; truely pointing to the first byte of the record.  Since the total record size
                     0189  ; includes the count field, if that value is different from the one calculated
                     0189  ; for the journal entry, then the record has a count field and it should be
                     0189  ; skipped.
                     0189  ;
                     0189  ;-
                     0189
  50   66 A9    3C   0189          MOVZWL  IRB$W_RTOTLSZ(R9), R0         ; Get total record size
     50   56    C2   018D          SUBL2   R6, R0                        ; Determine count field length
     55   50    C0   0190          ADDL2   R0, R5                        ; Move pointer over count field
                     0193
                     0193  ;+
                     0193  ;
                     0193  ; Save the current record pointer, in case the record crosses into the next
                     0193  ; buffer causing the rest of the record is read into the buffer.  After the
                     0193  ; whole record has been copied to the journal entry, the current record pointer
                     0193  ; will be needed to restore the current contents of the buffer.
                     0193  ;
                     0193  ;-
                     0193
                     0193          ASSUME  IRB$W_RP_OFF EQ <IRB$L_RP_VBN + 4>
  7E   48 A9    7D   0193          MOVQ    IRB$L_RP_VBN(R9), -(SP)
                     0197
                     0197  ;+
                     0197  ;
                     0197  ; Copy the record to the journal entry.  The current register contents are:
                     0197  ;
                     0197  ;       R1 - address of first byte of RJR record image (destination)
                     0197  ;       R5 - first byte of record in buffer (source)
                     0197  ;       R6 - number of bytes to transfer to journal entry
                     0197  ;       R7 - end of buffer address + 1
                     0197  ;
                     0197  ;-
                     0197
                     0197  COPY_DATA:
 50   57   55   C3   0197          SUBL3   R5, R7, R0                    ; Get # of bytes left in source buff
      56   50   D1   019B          CMPL    R0, R6                        ; Is whole record in buffer?
           03   1B   019E          BLEQU   10$                           ; No, transfer size = remaining buff
      50   56   D0   01A0          MOVL    R6, R0                        ; Yes, use rec len as transfer size
      56   50   C2   01A3  10$:    SUBL2   R0, R6                        ; Adjust size of record
 61   65   50   28   01A6          MOVC3   R0, (R5), (R1)                ; Copy the (partial) record
           56   D5   01AA          TSTL    R6                            ; Any data left to copy?
           02   12   01AC          BNEQ    20$                           ; Yes, refill buffer, copy rest of r
           15   11   01AE          BRB     RESTORE_BUFF                  ; No, copy is complete
           08   BB   01B0  20$:    PUSHR   #^M<R3>                       ; Save source and destination
         00FC   30   01B2          BSBW    CHANGE_BUFF                   ; Get next buffer
      55   51   D0   01B5          MOVL    R1, R5                        ; Save source location
           51 8ED0   01B8          POPL    R1                            ; Restore the destination
      D9   50   E8   01BB          BLBS    R0, COPY_DATA                 ; Copy rest of record or fall thru t
                     01BE
                     01BE  BI_ERROR_EXIT:
                     01BE          ASSUME  IRB$W_RP_OFF EQ <IRB$L_RP_VBN + 4>
  48 A9   8E    7D   01BE          MOVQ    (SP)+, IRB$L_RP_VBN(R9)       ; Retrieve record pointer
         00E7   31   01C2          BRW     EXIT_BI_RTN                   ; Return with error status
                     01C5
                     01C5  RESTORE_BUFF:
                             01C5    540          ASSUME  IRB$W_NRP_OFF EQ <IRB$L_NRP_VBN + 4>
          40 A9   8E    7D   01C5    541          MOVQ    (SP)+, IRB$L_NRP_VBN(R9)         ; Retrieve record pointer
        00000000'EF     16   01C9    542          JSB     RM$GETBLKNRP                     ; Restore contents of the buffer
                 00DA   31   01CF    543          BRW     EXIT_BI_RTN                      ; Return with error status
```

```
                                    01D2   545 ;+
                                    01D2   546 ;
                                    01D2   547 ; The current operation involves truncation ($TRUNCATE or $PUT, with TPT set).
                                    01D2   548 ; The rest of the file must be copied to the journal.  This is done one buffer
                                    01D2   549 ; at a time, from the current VBN to the EOF.  The journal entries are formatted
                                    01D2   550 ; as BLOCK I/O entries, not record entries.  Recovery should be done as a series
                                    01D2   551 ; of $WRITEs.
                                    01D2   552 ;
                                    01D2   553 ;-
                                    01D2   554
                                    01D2   555 ;
                                    01D2   556 ;       ***********************************************************
                                    01D2   557 ;       *
                                    01D2   558 ;       *  THE CODE FOR BI JOURNALING OF TRUNCATE OPERATIONS HAS NOT
                                    01D2   559 ;       *  BEEN TESTED.
                                    01D2   560 ;       *
                                    01D2   561 ;       ***********************************************************
                                    01D2   562
                                    01D2   563 BI_TRUNC_ENTRY:
                                    01D2   564
                                    01D2   565 ;
                                    01D2   566 ; Write all dirty buffers out to the disk, to be sure that the file is in a
                                    01D2   567 ; consistent state before any data is copied to the journal.
                                    01D2   568 ;
                                    01D2   569
          00000000'EF     16        01D2   570         JSB     RM$FLUSH                        ; Write buffers to disk
                3F 50     E8        01D8   571         BLBS    R0, 10$                         ; If that worked, keep going
                 00CE     31        01DB   572         BRW     EXIT_BI_RTN                     ; Get out on error
                                    01DE   573
                                    01DE   574 ;
                                    01DE   575 ; Determine the maximum size for the journal entry.  Check to see if it fits
                                    01DE   576 ; in the current journal buffer.
                                    01DE   577 ;
                                    01DE   578
             55    55 A9     9A     01DE   579         MOVZBL  IRB$B_MBC(R9), R5               ; at most, MBC # of blks will be cop
                      55     D6     01E2   580         INCL    R5                              ; MBC is zero based, not one based
             55    48 AA     C4     01E4   581         MULL2   IFB$L_DEVBUFSIZ(R10), R5        ; Convert to bytes
   55     00000044 8F        C0     01E8   582         ADDL    #RJR$C_BLKLEN, R5               ; Include jnl entry overhead in size
             55    2C A4     B1     01EF   583         CMPW    BDB$W_ALLOC_SIZE(R4), R5        ; Will it fit in the curr buff?
                      2D     1E     01F3   584         BGEQU   20$                             ; Yes, continue processing
                                    01F5   585
                                    01F5   586 ;
                                    01F5   587 ; Get a new journal buffer is needed; the current one is too small.  Initialize
                                    01F5   588 ; any journal entry fields which are assumed to already have values in them.
                                    01F5   589 ;
                                    01F5   590
                      55     DD     01F5   591         PUSHL   R5                              ; Save jnl buff size
          00000000'EF        16     01F7   592         JSB     RM$RETJNLBDB                    ; Release this buffer
   55     000001FF 8F        C0     01FD   593         ADDL2   #511, R5                        ; Round the number of bytes to
   55     000001FF 8F        CA     0204   594         BICL    #511, R5                        ;    up to a page boundary
                   55 8ED0          020B   595         POPL    R5                              ; Restore jnl buffer size
          00000000'EF        16     020E   596         JSB     RM$ALDJNLBUF                    ; Get a new BDB and buffer
                03 50        E8     0214   597         BLBS    R0, 10$                         ; Continue if new BDB is okay
                 0092        31     0217   598         BRW     EXIT_BI_RTN
          30 A9    54        D0     021A   599 10$:    MOVL    R4, IRB$L_JNLBDB(R9)            ; Save the jnl BDB address
          04 A3    00        90     021E   600         MOVB    #RJR$C_SEQ, RJR$B_ORG(R3)       ; File is sequential organization
                                    0222   601
```

```
                                 0222   ;
                                 0222   ; Initialize the journal BDB and the journal entry. The jnl entry should look
                                 0222   ; like a BLOCK I/O operation is happening.
                                 0222   ;
                                 0222
      1C A4    48 AA      D0     0222   20$:    MOVL    IRB$L_RP_VBN(R10), BDB$L_VBN(R4); Start VBN is VBN of curr rec
  55   00000044 8F        C2     0227           SUBL2   #RJR$C_BLKLEN, R5               ; Ovrhd not included in # bytes to j
         14 A4    55      B0     022E           MOVW    R5, BDB$W_NUMB(R4)              ; Size of tranfer into jnl entry
         03 A3    03      90     0232           MOVB    #RJR$C_BLOCK, RJR$B_ENTRY_TYPE(R3)   ; Block mode I/O
         05 A3    1E      90     0236           MOVB    #RJR$_WRITE, RJR$B_OPER(R3)         ; Operation is psuedo-$WRITE
      3C A3    1C A4      D0     023A           MOVL    BDB$L_VBN(R4), RJR$L_BLOCK_VBN(R3)   ; VBN of 1st blk being jnl'd
      40 A3    14 A4      3C     023F           MOVZWL  BDB$W_NUMB(R4), RJR$L_BLOCK_SIZE(R3) ; # of bytes being jnl'd
                                 0244
                                 0244   ;+
                                 0244   ;
                                 0244   ; Do until beyond EOF:
                                 0244   ;    If EOF is in current buffer, set the number of bytes to journal so that
                                 0244   ;    only data up to the first free byte is read into the journal buffer.
                                 0244   ;    Read data into the journal entry and write the entry to the journal.
                                 0244   ;    Determine the start VBN for the next buffer.
                                 0244   ;
                                 0244   ;-
                                 0244
         51    55 A9      9A     0244           MOVZBL  IRB$B_MBC(R9), R1               ; EOF is in buffer if:
                  51      D6     0248           INCL    R1                              ;  (MBC + 1) + start VBN
    52   51    48 A9      C1     024A           ADDL3   IRB$L_RP_VBN(R9), R1, R2        ;  is greater than EBK
                                 024F   MAKE_TRUNC_ENTRY:
         74 AA    52      D1     024F           CMPL    R2, IFB$L_EBK(R10)              ; Is EOF in the current buffer?
                  0F      1F     0253           BLSSU   10$                             ; No, journal whole buffer
  50   48 AA   5C AA      A3     0255           SUBW3   IFB$W_FFB(R10), IFB$L_DEVBUFSIZ(R10), R0 ; How many bytes are unused
         14 A4    50      A2     025B           SUBW2   R0, BDB$W_NUMB(R4)              ; Decrement # of bytes to jnl
      40 A3    14 A4      3C     025F           MOVZWL  BDB$W_NUMB(R4), RJR$L_BLOCK_SIZE(R3) ; Same for jnl entry size
                                 0264
                                 0264   ;
                                 0264   ; Read VBNs into jnl buffer from the disk.
                                 0264   ;
                                 0264
                                 0264           ASSUME  RJR$C_BLKLEN EQ RJR$T_BLOCK
 18 A4   00000044 8F      C0     0264   10$:    ADDL2   #RJR$C_BLKLEN, BDB$L_ADDR(R4)   ; Use RJR$T_BLOCK as dest for read
                  0E      BB     026C           PUSHR   #^M<R1, R2, R3>                 ; Save pointers and counters
         00000000'EF      16     026E           JSB     RM$RDBUFWT                      ; Read in data and wait for completi
 18 A4   00000044 8F      C2     0274           SUBL2   #RJR$C_BLKLEN, BDB$L_ADDR(R4)   ; Return to real start of jnl buffer
               05 50      E8     027C           BLBS    R0, 20$                         ; If read worked, continue
                  0E      BA     027F           POPR    #^M<R1, R2, R3>                 ; Otherwise, restore regs
                0028      31     0281           BRW     EXIT_BI_RTN                     ; Get our on error
                                 0284
                                 0284   ;
                                 0284   ; Write journal entry out to journal.
                                 0284   ;
                                 0284
      14 A4   0044 8F     A0     0284   20$:    ADDW2   #RJR$C_BLKLEN, BDB$W_NUMB(R4)   ; Ovrhd included in jnl entry size
                  2E      10     028A           BSBB    WRTBIJNL                        ; Write jnl entry
                  0E      BA     028C           POPR    #^M<R1, R2, R3>                 ; Restore pointers and counters
               1B 50      E9     028E           BLBC    R0, EXIT_BI_RTN                 ; Get out on error
      14 A4   0044 8F     A2     0291           SUBW2   #RJR$C_BLKLEN, BDB$W_NUMB(R4)   ; Remove ovrhd from jnl entry size
                                 0297
                                 0297   ;
```

```
                         0297   659 ; Determine start and end VBN of next buffer.
                         0297   660 ;
                         0297   661
        1C A4    52  D0  0297   662         MOVL    R2, BDB$L_VBN(R4)                  ; Start VBN was already calculated
  3C A3    1C A4     D0  029B   663         MOVL    BDB$L_VBN(R4), RJR$L_BLOCK_VBN(R3) ; Save start VBN in jnl entry
           52    51  C0  02A0   664         ADDL2   R1, R2                             ; Get 1st VBN past next buffer
     74 AA       52  B1  02A3   665         CMPW    R2, IFB$L_EBK(R10)                 ; Is EOF in next buffer?
                 03  1A  02A7   666         BGTRU   EXIT_BI_RTN                        ; No, do not jnl past EOF (it has be
               FFA3  31  02A9   667         BRW     MAKE_TRUNC_ENTRY                   ; Journal next set of blocks
                         02AC   668
                         02AC   669
                         02AC   670 PUT_ENTRY:
                         02AC   671 EXIT_BI_RTN:
           00F0 8F   BA  02AC   672         POPR    #^M<R4, R5, R6, R7>
                     05  02B0   673         RSB                                        ; Return to caller
                         02B1   674
```

```
                          02B1          .SBTTL  CHANGE_BUFF - get next buffer
                          02B1
                          02B1    ;++
                          02B1    ;
                          02B1    ; FUNCTIONAL DESCRIPTION:
                          02B1    ;
                          02B1    ;       CHANGE_BUFF calls RM$NXTBLK1 for MAKE_BI_JNL.
                          02B1    ;
                          02B1    ; CALLING SEQUENCE:
                          02B1    ;
                          02B1    ;       BSBB    CHANGE_BUFF
                          02B1    ;
                          02B1    ; INPUT PARAMETERS:
                          02B1    ;
                          02B1    ;       R8      RAB
                          02B1    ;       R9      IRAB
                          02B1    ;       R10     IFAB
                          02B1    ;
                          02B1    ; IMPLICIT INPUTS:
                          02B1    ;
                          02B1    ;       None
                          02B1    ;
                          02B1    ; OUTPUT PARAMETERS:
                          02B1    ;
                          02B1    ;       R0      Status
                          02B1    ;       R1 - R3 Destroyed
                          02B1    ;
                          02B1    ; IMPLICIT OUTPUTS:
                          02B1    ;
                          02B1    ;       R1      address of current block in buffer
                          02B1    ;       R7      address of end of buffer + 1
                          02B1    ;
                          02B1    ; COMPLETION CODES:
                          02B1    ;
                          02B1    ;       Any completion code returned by RM$NXTBLK1
                          02B1    ;
                          02B1    ; SIDE EFFECTS:
                          02B1    ;
                          02B1    ;       None
                          02B1    ;
                          02B1    ;--
                          02B1
                          02B1    CHANGE_BUFF:
             53    D4     02B1          CLRL    R3                              ; Indicate read required
      00000000'EF  16     02B3          JSB     RM$NXTBLK1                      ; Get new buffer contents
                   05     02B9          RSB
                          02BA
```

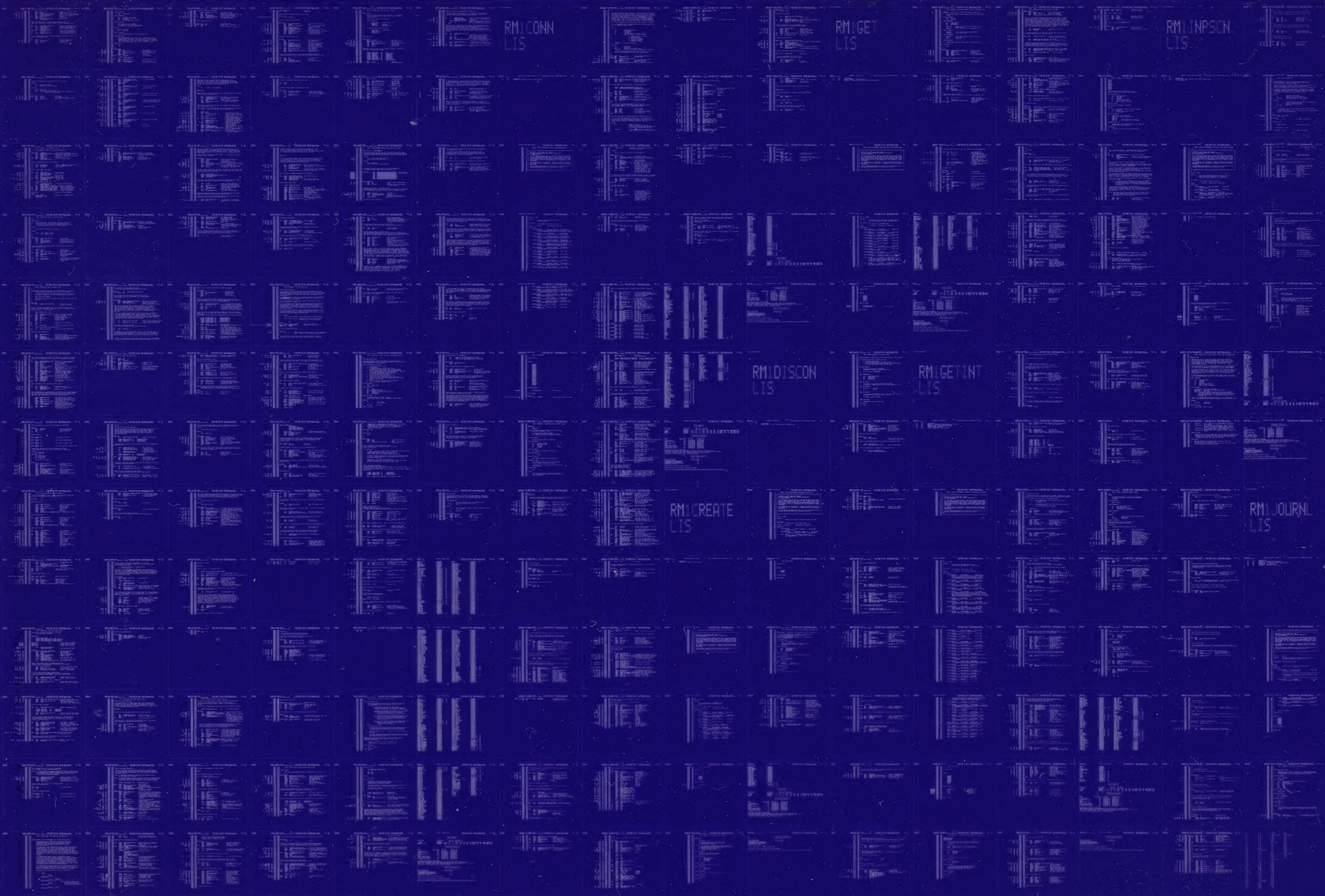
```
                             02BA           .SBTTL  WRTBIJNL - writes BI/RU journal entry
                             02BA
                             02BA   ;++
                             02BA   ;
                             02BA   ; FUNCTIONAL DESCRIPTION:
                             02BA   ;
                             02BA   ;       WRTBIJNL writes a BI/RU jnl entry
                             02BA   ;
                             02BA   ; CALLING SEQUENCE:
                             02BA   ;
                             02BA   ;       BSBB    WRTBIJNL
                             02BA   ;
                             02BA   ; INPUT PARAMETERS:
                             02BA   ;
                             02BA   ;       R4      Journal BDB
                             02BA   ;       R8      RAB
                             02BA   ;       R9      IRAB
                             02BA   ;       R10     IFAB
                             02BA   ;
                             02BA   ; IMPLICIT INPUTS:
                             02BA   ;
                             02BA   ;       None
                             02BA   ;
                             02BA   ; OUTPUT PARAMETERS:
                             02BA   ;
                             02BA   ;       R0      Status
                             02BA   ;       R1      Destroyed
                             02BA   ;
                             02BA   ; IMPLICIT OUTPUTS:
                             02BA   ;
                             02BA   ;       None
                             02BA   ;
                             02BA   ; COMPLETION CODES:
                             02BA   ;
                             02BA   ;       Any completion code returned by RM$WRTJNL
                             02BA   ;
                             02BA   ; SIDE EFFECTS:
                             02BA   ;
                             02BA   ;       None
                             02BA   ;
                             02BA   ;--
                             02BA
                             02BA   WRTBIJNL:
12 00A0 CA    02      E1     02BA           BBC     #IFB$V_BI, IFB$B_JNLFLG(R10), 10$ ; If BI/RU jnl'ing, write a BI/RU
     06 A3    02      90     02C0           MOVB    #RJR$C_RMS_BI, RJR$B_JNL_TYPE(R3) ; This is a BI journal entry
              54      DD     02C4           PUSHL   R4                                ; Use jnl BDB as relate BDB
        7E    02      9A     02C6           MOVZBL  #CJF$_BI, -(SP)                   ; Pass jnl type to WRTBIJNL
           FD34'      30     02C9           BSBW    RM$WRTJNL                         ; Write jnl entry
        5E    08      C0     02CC           ADDL2   #8, SP                            ; Remove args from stack
           15 50      E9     02CF           BLBC    R0, 20$                           ; Get out on error
                             02D2
0F 00A0 CA    01      E1     02D2   10$:    BBC     #IFB$V_RU, IFB$B_JNLFLG(R10), 20$ ; If RU jnl'ing, write a RU entry
     06 A3    03      90     02D8           MOVB    #RJR$C_RMS_RU, RJR$B_JNL_TYPE(R3) ; This is an RU journal entry
              54      DD     02DC           PUSHL   R4                                ; Use jnl BDB as relate BDB
        7E    01      9A     02DE           MOVZBL  #CJF$_RU, -(SP)                   ; Pass jnl type to WRTBIJNL
           FD1C'      30     02E1           BSBW    RM$WRTJNL                         ; Write jnl entry
        5E    08      C0     02E4           ADDL2   #8, SP                            ; Remove args from stack
```

```
                02E7   781
            05  02E7   782 20$:    RSB
                02E8   783
                02E8   784         .END
```

```
$$.PSECT_EP                    = 00000000               MAKE_TRUNC_ENTRY              0000024F R     01
$$RMSTEST                      = 0000001A               PUT_ENTRY                     000002AC R     01
$$RMS_PBUGCHK                  = 00000010               RAB$L_RHB                   = 0000002C
$$RMS_TBUGCHK                  = 00000008               RESTORE_BUFF                  000001C5 R     01
$$RMS_UMODE                    = 00000004               RJR$B_ENTRY_TYPE            = 00000003
BDB$B_FLGS                     = 0000000A               RJR$B_JNL_TYPE              = 00000006
BDB$B_REL_VBN                  = 00000048               RJR$B_OPER                  = 00000005
BDB$L_ADDR                     = 00000018               RJR$B_ORG                   = 00000004
BDB$L_VBN                      = 0000001C               RJR$C_BLKLEN                = 00000044
BDB$V_PRM                      = 00000003               RJR$C_BLOCK                 = 00000003
BDB$W_ALLOC_SIZE               = 0000002C               RJR$C_RECLEN                = 00000048
BDB$W_NUMB                     = 00000014               RJR$C_RECORD                = 00000002
BI_ERROR_EXIT                    000001BE R     01      RJR$C_RMS_AI                = 00000001
BI_TRUNC_ENTRY                   000001D2 R     01      RJR$C_RMS_BI                = 00000002
CHANGE_BUFF                      000002B1 R     01      RJR$C_RMS_RU                = 00000003
CJF$_AI                        = 00000003               RJR$C_SEQ                   = 00000000
CJF$_BI                        = 00000002               RJR$L_BLOCK_SIZE            = 00000040
CJF$_RU                        = 00000001               RJR$L_BLOCK_VBN             = 0000003C
COPY_DATA                        00000197 R     01      RJR$L_RFA0                  = 00000040
ERRBUF                           00000126 R     01      RJR$T_BLOCK                 = 00000044
ERRRHB                           0000011F R     01      RJR$T_RIMAGE                = 00000048
EXIT                             000000AD R     01      RJR$W_RFA4                  = 00000044
EXIT_AI_RTN                      0000011C R     01      RJR$W_RSIZE                 = 00000046
EXIT_BI_RTN                      000002AC R     01      RJR$_PUT                    = 00000013
FAB$C_FIX                      = 00000001               RJR$_TPT                    = 0000001F
FAB$C_MAXRFM                   = 00000006               RJR$_TRUNCATE               = 0000001B
FAB$C_STM                      = 00000004               RJR$_UPDATE                 = 0000001C
FAB$C_STMCR                    = 00000006               RJR$_WRITE                  = 0000001E
FAB$C_STMLF                    = 00000005               RM$ALDJNLBUF                  ********   X   01
FAB$C_UDF                      = 00000000               RM$FLUSH                      ********   X   01
FAB$C_VAR                      = 00000002               RM$GETBLKNRP                  ********   X   01
FAB$C_VFC                      = 00000003               RM$NXTBLK1                    ********   X   01
IFB$B_FSZ                      = 0000005F               RM$PROBEREAD                  ********   X   01
IFB$B_JNLFLG                   = 000000A0               RM$RDBUFWT                    ********   X   01
IFB$B_RECVRFLGS                = 000000A1               RM$RETJNLBDB                  ********   X   01
IFB$B_RFMORG                   = 00000050               RM$SEQJNL                     00000000 RG    01
IFB$L_DEVBUFSIZ                = 00000048               RM$WRTJNL                     ********   X   01
IFB$L_EBK                      = 00000074               RMS$_RBF                    = 00018654
IFB$V_AI                       = 00000003               RMS$_RHB                    = 0001866C
IFB$V_BI                       = 00000002               TRUNC_ENTRY                   0000011C R     01
IFB$V_BI_RECVR                 = 00000002               WRTBIJNL                      000002BA R     01
IFB$V_RU                       = 00000001
IFB$V_RU_RECVR                 = 00000000
IFB$W_FFB                      = 0000005C
IRB$B_MBC                      = 00000055
IRB$B_MODE                     = 0000000A
IRB$L_CURBDB                   = 00000020
IRB$L_JNLBDB                   = 00000030
IRB$L_NRP_VBN                  = 00000040
IRB$L_RP_OFF                   = 0000004C
IRB$L_RP_VBN                   = 00000048
IRB$W_NRP_OFF                  = 00000044
IRB$W_ROVHDSZ                  = 00000064
IRB$W_RP_OFF                   = 0000004C
IRB$W_RTOTLSZ                  = 00000066
MAKE_AI_JNL                      000000B0 R     01
MAKE_BI_JNL                      0000012D R     01
```

```
                                            +----------------+
                                            ! Psect synopsis !
                                            +----------------+

PSECT name                     Allocation          PSECT No.  Attributes
----------                     ----------          ---------  ----------
.  ABS  .                      00000000  (     0.)  00 (   0.)  NOPIC   USR   CON   ABS   LCL NOSHR NOEXE NORD   NOWRT NOVEC BYTE
RM$RMS_JOURNAL                 000002E8  (   744.)  01 (   1.)    PIC   USR   CON   REL   GBL NOSHR   EXE   RD   NOWRT NOVEC BYTE
$ABS$                          00000000  (     0.)  02 (   2.)  NOPIC   USR   CON   ABS   LCL NOSHR   EXE   RD     WRT NOVEC BYTE

                                          +------------------------+
                                          ! Performance indicators !
                                          +------------------------+

Phase                       Page faults    CPU Time       Elapsed Time
-----                       -----------    --------       ------------
Initialization                      29    00:00:00.08    00:00:00.75
Command processing                 116    00:00:00.64    00:00:04.98
Pass 1                             351    00:00:12.00    00:00:36.97
Symbol table sort                    0    00:00:01.78    00:00:03.05
Pass 2                             138    00:00:02.85    00:00:07.67
Symbol table output                 13    00:00:00.11    00:00:00.20
Psect synopsis output                1    00:00:00.02    00:00:00.02
Cross-reference output               0    00:00:00.00    00:00:00.00
Assembler run totals               650    00:00:17.48    00:00:53.64

The working set limit was 1650 pages.
70414 bytes (138 pages) of virtual memory were used to buffer the intermediate code.
There were 70 pages of symbol table space allocated to hold 1275 non-local and 23 local symbols.
784 source lines were read in Pass 1, producing 14 object records in Pass 2.
23 pages of virtual memory were used to define 22 macros.

                                         +--------------------------+
                                         ! Macro library statistics !
                                         +--------------------------+

Macro library name                        Macros defined
------------------                        --------------
_$255$DUA28:[RMS.OBJ]RMS.MLB;1                        12
_$255$DUA28:[SYS.OBJ]LIB.MLB;1                         1
_$255$DUA28:[SYSLIB]STARLET.MLB;2                      5
TOTALS (all libraries)                                18

1385 GETS were required to define 18 macros.

There were no errors, warnings or information messages.

MACRO/LIS=LIS$:RM1JOURNL/OBJ=OBJ$:RM1JOURNL MSRC$:RM1JOURNL/UPDATE=(ENH$:RM1JOURNL)+EXECML$/LIB+LIB$:RMS/LIB
```

0321 AH-BT13A-SE DIGITAL EQUIPMENT CORPORATION
VAX/VMS V4.0 CONFIDENTIAL AND PROPRIETARY


RM1CONN
LIS

RM1GET
LIS

RM1INPSCN
LIS

RM1DISCON
LIS

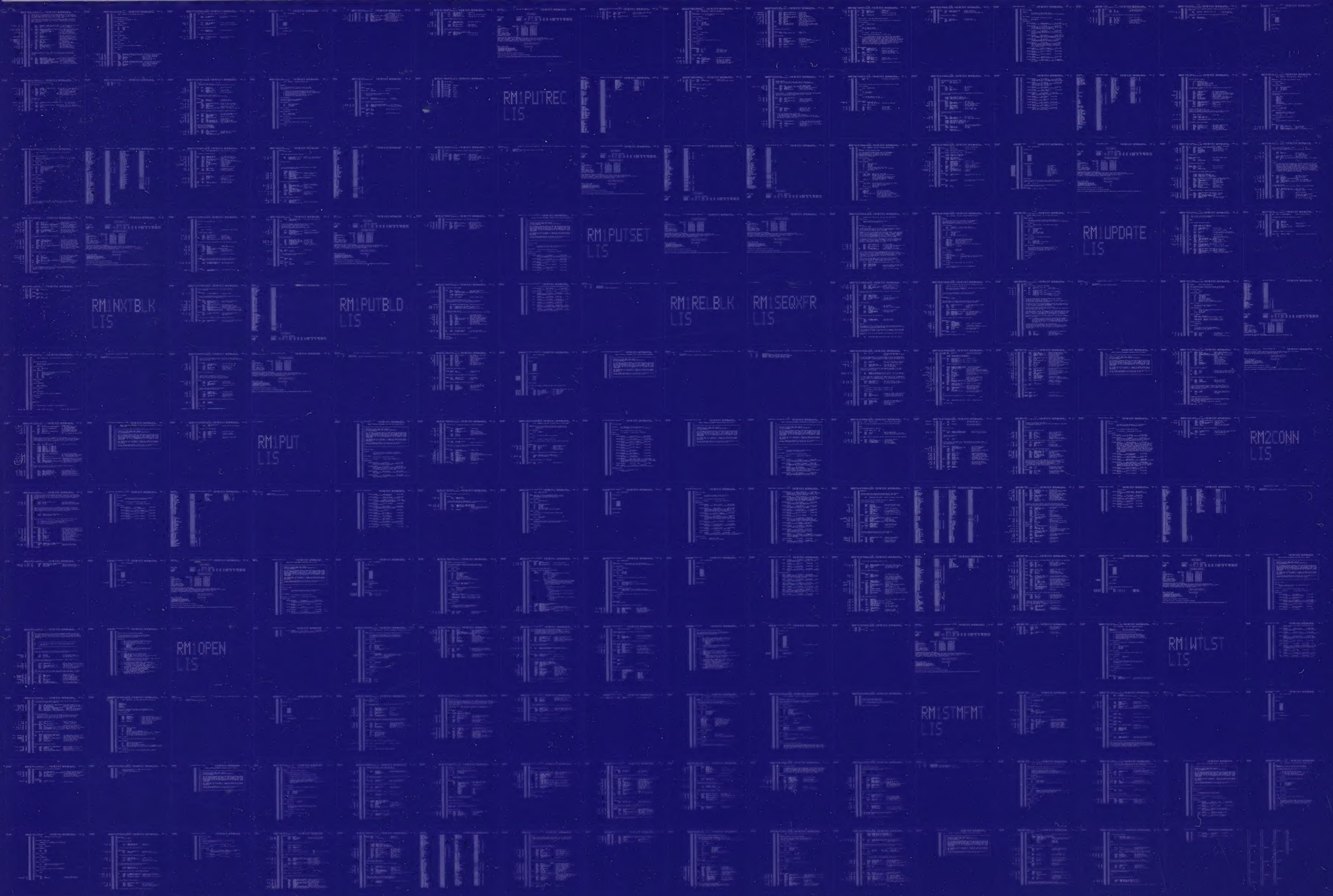
RM1GETINT
LIS

RM1CREATE
LIS

RM1JOURNL
LIS

0322 AH-BT13A-SE
VAX/VMS V4.0

DIGITAL EQUIPMENT CORPORATION
CONFIDENTIAL AND PROPRIETARY


RM1PUTREC
LIS

RM1PUTSET
LIS

RM1UPDATE
LIS

RM1NXTBLK
LIS

RM1PUTBLD
LIS

RM1RELBLK
LIS

RM1SEQXFR
LIS

RM1PUT
LIS

RM2CONN
LIS

RM1OPEN
LIS

RM1WTLST
LIS

RM1STMFMT
LIS